

Borehole

**50-00-08****Log Event A****Borehole Information**

Farm : <u>T</u>	Tank : <u>T</u>	Site Number : <u>299-W10-52</u>
N-Coord : <u>43,385</u>	W-Coord : <u>75.908</u>	TOC Elevation : <u>672.11</u>
Water Level, ft : <u>137.5</u>	Date Drilled : <u>10/31/1944</u>	

**Casing Record**

Type : <u>Steel-welded</u>	Thickness, in. : <u>0.250</u>	ID, in. : <u>4</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>148</u>	
Type : <u>Steel-welded</u>	Thickness, in. : <u>0.280</u>	ID, in. : <u>6</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>148</u>	

Cement Bottom, ft. : 148      Cement Top, ft. : 0

**Borehole Notes:**

Borehole 50-00-08 was drilled in September and October 1944 to a depth of 150 ft. According to the driller's log, a 12-in. casing was driven to 104 ft and a 10-in. casing was driven to 150 ft. These two casings were pulled and a 6-in. casing was installed from the ground surface to total depth. According to the driller's log, this casing was "preperforated" from 50 to 150 ft. Half a sack of cement was placed in the bottom of the casing. The driller's log does not record any grout between the casing and the formation. Field observations during borehole logging indicate concentric 4-in. and 6-in. casings at the ground surface with grout in the annular space. No record was available to indicate when the 4-in. casing was installed. An evaluation of historical gross gamma logs indicates the 4-in. casing was probably installed between September and October 1978. It is also likely that grout was placed in the annulus at this time.

The tops of both casings are approximately even with the ground surface. The top of casing, which is the zero reference for the SGLS, is at an elevation of 672.11 ft.

**Equipment Information**

Logging System : <u>2B</u>	Detector Type : <u>HPGe</u>	Detector Efficiency: <u>35.0 %</u>
Calibration Date : <u>10/1997</u>	Calibration Reference : <u>GJO-HAN-14</u>	Logging Procedure : <u>MAC-VZCP 1.7.10-1</u>

**Logging Information**

Log Run Number : <u>1</u>	Log Run Date : <u>03/18/1998</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>0.0</u>	Counting Time, sec.: <u>200</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>12.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>

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Log Run Number :	<u>2</u>	Log Run Date :	<u>03/19/1998</u>	Logging Engineer:	<u>Alan Pearson</u>
Start Depth, ft.:	<u>11.0</u>	Counting Time, sec.:	<u>200</u>	L/R : <u>L</u>	Shield : <u>N</u>
Finish Depth, ft. :	<u>66.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

Log Run Number :	<u>3</u>	Log Run Date :	<u>03/20/1998</u>	Logging Engineer:	<u>Alan Pearson</u>
Start Depth, ft.:	<u>65.0</u>	Counting Time, sec.:	<u>200</u>	L/R : <u>L</u>	Shield : <u>N</u>
Finish Depth, ft. :	<u>120.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

Log Run Number :	<u>4</u>	Log Run Date :	<u>03/23/1998</u>	Logging Engineer:	<u>Alan Pearson</u>
Start Depth, ft.:	<u>143.0</u>	Counting Time, sec.:	<u>200</u>	L/R : <u>L</u>	Shield : <u>N</u>
Finish Depth, ft. :	<u>119.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

**Logging Operation Notes:**

The borehole was logged in four runs on March 18, 19, 20, and 23, 1998. The total logging depth achieved by the SGLS was 143 ft. Spectra were collected at intervals of 0.5 ft, using a 200-s count time at each interval.

At the time of logging, there was water in the borehole. The depth to water inside the casing was measured at 137.5 ft. This water is probably the result of surface runoff.

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**Analysis Information**

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Analyst : R.G. McCainData Processing Reference : MAC-VZCP 1.7.9Analysis Date : 05/20/1998**Analysis Notes :**

The pre-survey and post-survey field verification measurements met acceptance criteria established for peak shape and system efficiency. Energy and resolution calibrations from the pre-survey and post-survey verification spectra were used to establish the channel-to-energy conversion and peak resolution parameters used in processing the spectra acquired during the logging operation.

From 57 to 62.5 ft, there was a gain shift that resulted in a significant error in peak energy levels. For this interval, an energy calibration based on observed peaks for natural radionuclides in a spectra from the approximate middle of the region was used to reprocess the spectra.

Peak spreading associated with the relatively thick double casing and the presence of grout was encountered and many lines associated with naturally occurring radionuclides were poorly defined. Also, the peak recognition software frequently indicated false peaks in the tails of significant peaks, particularly the K-40 peak at 1460.8 keV, the 1764.5-keV peak associated with the U-238 decay chain, and the 2614.6-keV peak associated with the Th-232 decay chain. These peaks were manually deleted.

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factor for a 0.50-in. thick steel casing was used to determine concentration data over the entire depth. This factor most closely matches the combined thickness of the 4-in. and 6-in. casing. This factor will tend to yield concentration values slightly lower than actual because no allowance is made for the annular grout, and the actual casing thickness is slightly greater than the assumed value.

Shape factor analysis was not performed on this log because there were relatively few indications of man-made radionuclides and because the effects of the double casing and annular grout on shape factors are not well known.

#### **Log Plot Notes:**

Separate plots show the man-made and naturally occurring radionuclides. Concentrations are shown as apparent concentrations to reflect the uncertainty associated with the dual casing and annular grout. The headings of the plots identify the specific gamma lines used to calculate concentrations. Uncertainty bars in the plots show statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plot indicate the MDL, which represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes man-made and natural radionuclides, the total gamma-ray count rate derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma log plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

#### **Results/Interpretations:**

The only man-made radionuclide detected in this borehole was Cs-137. Cs-137 contamination was detected at the ground surface and 0.5 ft at concentrations of 0.5 and 0.66 pCi/g, respectively. A concentration of 0.15 pCi/g was encountered in a single spectra at 75 ft in depth.

There is a significant reduction in natural radionuclide concentrations between approximately 40 and 50 ft. This concentration decrease appears to be the result of grout penetration into the surrounding formation through the "preperforated" slots in the 6-in. casing.